

EXHIBIT B

IPCOM GMBH & Co KG v HTC Europe Co. Ltd, Ingram Micro (UK) Limited, HTC Corporation

Case No: A3 2015 1954

Court of Appeal (Civil Division)

28 February 2017

[2017] EWCA Civ 90

2017 WL 00737385

Before : Lord Justice Longmore Lord Justice Kitchen and Lord Justice Floyd

Date: 28/02/2017

On Appeal from the High Court of Justice

Chancery Division

Patents Court

The Hon Mr Justice Birss

[2015] EWHC 1034 (Pat)

Hearing dates: 24-26 January 2017

Representation

Iain Purvis QC and Brian Nicholson (instructed by Bristows LLP) for the Appellant.

Adrian Speck QC and James Abrahams QC (instructed by Hogan Lovells International LLP) for the Respondents.

Approved Judgment

Lord Justice Floyd:

1 IPCom appeals, with the permission of the judge, from the decision of Birss J dated 24 April 2015 finding that European Patent (UK) 1 841 268 ("the patent" or "the patent in suit") was valid (in an amended form) but not infringed by the respondents' (collectively "HTC's") mobile phones. The appeal raises some short points on construction and infringement. In addition, HTC contend that, if IPCom's construction were to be accepted, then the patent would be invalid for disclosing added matter, and the amendments to the claim which the judge allowed should have been rejected on discretionary grounds.

2 The patent was granted on 17 March 2010. The application for the patent was divided out of the application for European Patent 1 186 189 ("the parent patent"). Proceedings in relation to the parent patent between Nokia and IPCom came before me at first instance in late 2009 and resulted in the parent patent being revoked (see [2009] EWHC 3482 (Pat)). That judgment was subsequently upheld in this court (see [2011] EWCA Civ 6), and an attempt by IPCom to limit the claims was rejected as being made too late. By then, however the (divisional) patent in suit had been granted. The patent in suit came before me, again in a trial between Nokia and IPCom, in April 2011. I held that the patent was valid in an amended form, and infringed by certain of Nokia's UMTS phones, but not others (see [2011] EWHC 1470 (Pat)). An appeal against that judgment was subsequently dismissed by this court ([2012] EWCA Civ 567). The patent was, however, also the subject of opposition proceedings in the EPO. By a decision dated 18 May 2012 the Opposition Division ("OD") held that the patent as granted was invalid on the ground of

added matter, and revoked it. On 7 March 2013 the Technical Board of Appeal ("TBA") found that a proposed amended claim (an "auxiliary request" in EPO-speak) overcame the objection of added matter and remitted the case back to the OD to determine the remaining issues in the opposition (see decision T1282/12). Subsequently the OD upheld the validity of the patent with the claim in the form approved by the TBA. The case is now pending before the TBA again, notwithstanding that it is now some three years since the decision at first instance. We were told that a date for the oral proceedings has not yet been set.

3 The present proceedings began on 16 April 2012, but in August 2012 the trial was stayed pending the appeal in the EPO from the OD's decision of 18 May 2012. Following the decision of the TBA of 7 March 2013, preparations for trial recommenced. The trial came before Birss J over three days in March 2015. IPCom applied in the proceedings to amend the principal claim of the patent to bring it into line with that approved by the TBA. As the judge explained, because of the suspensive effect of appeals in the EPO, as far as the EPO is concerned, the patent remained in its form as granted. The claim amendments approved by the TBA have not yet taken effect.

4 Neither side disputes the findings or reasoning in the prior decisions concerning the patent in this jurisdiction. The issues before the judge and on this appeal arise exclusively from the changes to the granted claim brought about by the amendments which IPCom seeks to make. HTC contend that the effect of the amendments is to prevent the HTC mobiles from being an infringement of the patent and that the patent is no longer essential to the UMTS standard (a concept which I explain below). IPCom contends to the contrary.

The language of the patent

5 The patent was published in German. The requirement, formerly imposed by section 77(6) of the Patents Act 1977, that a European Patent (UK) published in French or German was not to have effect in the UK unless a translation of the specification into English had been filed at the Patent Office and the prescribed fee paid, ceased to have effect on the coming into force of the Agreement on the application of Article 65 of the Convention on the Grant of European Patents ("the London Agreement"), that is to say on 1 May 2008. Accordingly, no translation of the patent into English needed to be filed at the Patent Office, and none was in fact filed.

6 Under section 80 of the Patents Act 1977, the authentic text of the patent is German. The amendments to the claims which Birss J allowed are in English. The parties are therefore agreed that the authentic specification of the patent is in German, but it has a set of English claims. We are told that the English claims are on the file at the Patent Office.

7 If the patent survives the opposition proceedings, the claims in German will take effect as the authentic text. If, on their proper interpretation in German they are narrower in scope than the English claims as amended, I would have thought that it would be the narrower claim which would have to be used for determining infringement. We did not hear detailed argument on this point. Rather it was assumed that this would be the position, and I will therefore assume it for the purposes of deciding this appeal.

Technical background

8 The UMTS mobile telecommunications standard is the background to a number of the issues in the case, not least because the claim of the patent is to a mobile " *for operation in a UMTS mobile radio network* ". In cases concerned with such standards it is common for patentees to take a short cut to establishing infringement by apparatus which complies with the standard. Thus, they assert that the published requirements of the standard necessarily involve infringement of the patent. In the jargon, the patent is said to be "essential to the standard". If the patentee can establish that the patent is essential to the standard, it will follow that mobiles which claim to comply with the standard will, on the face of it, infringe. For that reason, in the present case, IPCom not only allege infringement, but also seek a declaration of essentiality. It also follows that the issues of infringement considered by the judge and to be considered on this appeal can be considered by reference to the UMTS standard.

9 The invention the subject of the patent is concerned with how one controls access by mobile telephones in a UMTS network to a random access radio channel ("RACH") between the mobile

and the base station. In periods of heavy demand, there is a danger of collision between users' signals, allowing stronger signals through the channel at the expense of weaker ones. The problem is referred to as contention – or competition – between signals. The unsuccessful mobile can of course re-send its signal, but that would add to the congestion on the channel and possible overloading. One way in which the problem of contention is tackled is by restricting access by certain mobiles to the channel. A well-known means of restricting access involves a form of random number lottery. Each mobile generates for itself a random number and compares it with a value sent by the network. The mobile will be able to gain access if its random number is greater than or equal to the value sent by the network. The network can use its choice of this value to restrict or increase the percentage of mobiles which are able to gain access to the RACH. In this way a proportion of the mobiles are prevented from sending signals, thereby reducing the chances of contention between signals on the RACH.

10 Mobile networks can also assign each mobile to a particular access class which is embedded into the SIM card on the mobile. This provides the network with the capability to control what particular classes of mobile are able to do, including whether they can obtain access to the RACH.

11 The patent is also concerned with how the crucial elements of digital information necessary to control access to the RACH are sent over the network from the base station to the mobile. Engineers use the terms "logical channel" and "physical channel". To make system design easier, the different streams of communication to and from the terminal are considered to form different channels, where each channel has a different function. These channels are "logical" or "virtual" because they are simply distinct categorisations which the system makes of different parts of the data for management purposes. Physical channels are the channels which actually carry the data. A single physical channel may carry several logical channels by multiplexing.

12 The information necessary to control access to the RACH in UMTS is sent over the Broadcast Control Channel or BCCH. The BCCH is a one-way channel used by the network to send management information to the mobiles for a variety of purposes. The BCCH is a logical channel, not a physical channel.

13 Normally understood, a bit is a single binary digit. The skilled person would know that one needs a set of predefined rules to enable the relevant bits to be identified in a collection of bits. When more than one item of information is to be transmitted, the system needs to know how to identify what data represents which item of information. The judge explained two approaches to this question at paragraphs 25 and 26:

"25. One approach is to use a key value pair. Here each item of information comes in a pair consisting of an identifier (or key) and a value. The key tells the recipient what is being sent. The value is self-explanatory. However key value pairs are not efficient because in addition to the inevitable need to use transmission resources to send the value, resources are also needed to send the key.

"26. Another approach is to use context or position of data to convey what it relates to. The sender and the receiver agree the form in which the data will be sent in advance, so for the sake of argument the first four bits represent one piece of information and the next eight bits represent another. Then all that needs to be transmitted is the 12 bits of information. The information can be sent repeatedly in this way. The values can change but the repeating pattern tells you what the values relate to. Dr Irvine accepted this way of looking at it. The rules required to parse the collection of bits can be agreed in advance so as to avoid taking up transmission capacity."

The patent

14 I described the disclosure of the specification in paragraphs 22 to 42 of my earlier judgment at [2011] EWHC 1470 (Pat). I will not repeat all of it here. The important points to note are as follows.

15 The specification addresses itself to the problem, which I have described, of contention between signals on the RACH. It contains a description of the lottery method of restricting

access, which it describes as using a minimum of transmission capacity. The value transmitted by the base station for comparison with the random number is referred to as the "access threshold value".

16 The specification also describes the ability of the base station to check from "access class information" whether the user is in a "prescribed user class" and, if so, for access to the channel to be granted on the basis of the access class information alone (i.e. without doing the lottery). Access on the basis of access class information can therefore be granted irrespective of the access threshold value.

17 The specification contains two exemplary embodiments, only the second of which is the subject of the claim. I explained the first embodiment in my earlier judgment in the following way:

"32. ... the specification then goes on to describe the first embodiment with reference to figures 3a and 3b. This is the embodiment I described as the "10 bit embodiment" in my judgment in the parent action. Those figures look like this:



33. These figures represent alternative bit patterns which are transmitted by the network to the mobile stations on a broadcast channel. The first bit in each pattern is an

evaluation bit S4. In figure 3a, S4 is 0 and will be used when the network desires to control access by lottery. In figure 3b, S4 is 1 and will be used when it is desired to control access by a class method. When S4 is 0, the following four bits, S3, S2, S1, and S0, are access threshold values. These four bits can be used to transmit 16 different access threshold values to the mobile stations (16 is the number of options that four binary bits gives you). Of course, the same access threshold value will be sent to all the mobile stations. The access threshold value can be set to a greater or lesser value so as to throttle back access to the network.

34. In figure 3b the evaluation bit S4 is set to 1. In this case the second, third, fourth and fifth bits are not defined as access threshold value bits but rather as access class bits. So this pattern will be used when it is desired to control access by means of access classes. Each of the access class bits Z3, Z2, Z1 and Z0 represents a particular user class. The arrangement is such that if the access class bit has a value zero, then all the mobile stations in the associated user class can access the random access channel. If the access class bit is set to 1, then none of the mobile stations in that user class can access the channel.

35. At the end of paragraph [0033], the specification explains in summary that the S4 bit determines whether the second to fifth bits are interpreted in line with the first bit pattern (figure 3a) or in line with the second bit pattern (figure 3b). It would accordingly be understood that when the specification spoke earlier about granting access irrespective of access threshold value, it could be referring to sending the figure 3b bit pattern, that is to say simply basing access on access class, when there are no received access threshold value bits."

18 Birss J explained this further at paragraph 34 of his judgment under appeal:

"It will be seen that the first embodiment involves using two bit patterns which are each ten bits in length. The first bit (S4) is an evaluation bit. It determines which form the bit pattern is taking. If S4 is 0 then the bit pattern is in the form of fig 3a while if S4 is 1 the pattern is in the form of fig 3b. Although the two forms are very similar patterns, they are not the same. In the fig 3a form, bits S3, S2, S1 and S0 work together to make a four bit binary number from 0 to 15 which represents a threshold value whereas in the fig 3b form the four bits in the corresponding location, now labelled Z3, Z2, Z1 and Z0, each represent a flag relating to a particular user class."

19 I described the second embodiment at paragraphs 36 to 40 of my earlier judgment:

"36. The description of the second embodiment begins at [0034]. ... The specification says that this embodiment is "based on the invention defined in the claims". It describes this as follows:

"...in figure 3c, a third bit pattern ... having a bit length of 13 bits is transmitted from the base station ... to the mobile stations ... with the information signals. The third bit pattern ... does not have an evaluation bit S4 and therefore comprises both the access threshold value bits S3, S2, S1, S0 and the access class bits Z3, Z2, Z1, Z0. In addition the third bit pattern ... like the first bit pattern ... and the second bit pattern ... comprise the telecommunications service bits D2, D1, D0 and the priority bits P1, P0."

37. Figure 3c looks like this:



38. I have described what the priority bits (P1, P0) do above. The telecommunications service bits (D2, D1, D0) are bits which define whether particular services, such as data or voice can be used. [0034] continues:

"Mobile stations belonging to a user class for which the associated access class bit = 0 are able to access the RACH ... irrespective of the access threshold value S and of the priority threshold value P, and hence possibly without evaluation thereof in the evaluation unit... Mobile stations belonging to a user class whose associated access class bit has been set to 1, and mobile stations which do not belong to a user class, must perform the access threshold value evaluation already described in the first exemplary embodiment, and where applicable, in addition, the priority threshold value evaluation described in the first exemplary embodiment, in order to ascertain their access authorization for the RACH."

39. The skilled person would appreciate that what is envisaged is a system in which both access threshold value and user class information are sent to the mobile stations. The setting of the user class bit for any given class determines whether that class is able to access the RACH without doing the lottery, or whether instead it must be subjected to the lottery. Which it does can be altered by the network by setting the bit. Paragraph [0034] concludes:

"In contrast to the first exemplary embodiment, it is, in the case of the second exemplary embodiment, possible that, alongside mobile stations permitted to access the RACH ... due to their association with a user class, access to the RACH ... is granted also to those mobile stations which draw a random or pseudo-random number R [of] greater than or equal to the access threshold value S and where applicable have a priority value above the priority threshold value P."

40. This passage is explaining that, in this embodiment, there are mobiles which will be permitted to access the RACH due to their user class, as well as mobiles which will be able to access the RACH only if they "win" the lottery. The skilled person would therefore appreciate by this stage that, in this embodiment of the invention, the network can discriminate between groups of users, for example ensuring that the emergency services are permitted access without having to do the lottery. He (or she) would also appreciate that at the same time the network can control the unfavoured users' access to the RACH by means of the lottery, by appropriate setting of the access threshold value. It would be clear that this functionality is additional to that provided by the first embodiment."

20 IPCom describes the two routes of access feature as providing both "horizontal and vertical control". More prosaically, at [55] of my earlier judgment, I summarised the invention as:

"... providing, in a bandwidth efficient manner, a means for the network dynamically to adjust specific groups of users into a population with a priority access to the network independent of access threshold while at the same time using that access threshold ... dynamically [to] control the access of other users."

21 As the judge explained at paragraph 37, one of the ways in which the second embodiment differs from the first is that the second embodiment has a single bit pattern which carries all the relevant information. Both kinds of information (access class control and threshold values) are available at the same time in the second embodiment. That is in contrast to the first embodiment, where only one kind of information is sent at any one time. It is this feature of the second embodiment which allows for the horizontal and vertical control.

22 Another difference between the two embodiments lies in the meaning of the "access class bit". In the first embodiment the relevant access class bit determines whether a mobile can or cannot access the RACH at all. In the second embodiment, a mobile which is rejected on the basis of class may nevertheless gain access via the lottery. As the judge put it pithily: in the first embodiment "no" means "no", whereas in the second "no" means "maybe".

The claims

23 As granted, claim 1 was in the following form:

"Mobile station for operation in a UMTS mobile radio network in which multiple user classes are distinguished characterised in that the mobile station is arranged to read a user class from a SIM card to receive access threshold value bits and access class information over a broadcast control channel to determine an access threshold value from the access threshold value bits to use the access class information relevant for the user class to determine whether the mobile station is permitted to access a random access channel, for example RACH, independent of the received access threshold value bits or whether the access permission for the random access channel, for example RACH, is determined on the basis of an evaluation of the access threshold value."

24 The amendment allowed to the claims in the Nokia proceedings added the words " *by comparison of the access threshold value with a random number or pseudo random number* " at the end of the claim, but the significance of this amendment is eclipsed by those subsequently sought before, and granted by, Birss J. IPCom's application to amend the patent thus creates a single claim as follows, showing the amendments from the current UK claim 1:

"Mobile station (5, 10, 15, 20) for operation in a UMTS mobile radio network in which multiple user classes (35, 40) are distinguished, in which information signals with access authorization data are transmitted to the mobile station, wherein the access authorization data are transmitted as a bit pattern , characterised in that the mobile station (5, 10, 15, 20) is arranged:

to read a user class (35, 40) from a SIM card (75),

to receive the access authorization data, which have access threshold value bits (S3, S2, S1, S0) and access class information bits (Z0, Z1, Z2, Z3) over a broadcast control channel (25)

to determine an access threshold value (S) from the access threshold value bits (S3, S2, S1, S0), if the access authorization for the random access channel is determined

on the basis of an access threshold value evaluation

to use by means of the access class information bit (Z0, Z1, Z2, Z3) relevant for the user class (35, 40) to determine whether the mobile station (5, 10, 15, 20) is permitted to access a random access channel, for example RACH, independent of the received access threshold value bits (S3, S2, S1, S0), or whether the access permission authorization for the random access channel, for example RACH, is to be determined on the basis of an evaluation of the access threshold value, and is arranged to compare by comparison of the access threshold value (S) with a random number or pseudo random number (R) as the access threshold value evaluation, and is arranged to access the random access channel dependent on the determination using the access class bit, either independent of the received access threshold value bits (S3, S2, S1, S0) or dependent on the result of the comparison .

25 There was no dispute that the claim as thus amended focuses, at least in part, on the way in which the data is transmitted. In construing the claims, therefore, efficiency of data transmission must be taken to have been part of the inventor's purpose. A number of passages in the specification expressly draw attention to efficiency of data transmission. In view of the common ground, is not necessary to recite them here.

26 ICom's stated purpose in making these further amendments was to bring the claim in the UK into line with that being sought in the EPO, which the TBA had approved. The issues of construction which arise concern the interpretation of two phrases which appear for the first time in the claim. The first is the words " *wherein the access authorization data are transmitted as a bit pattern* ". The second is the words " *access class bit* ". Before turning to those issues I need to say something about the way in which UMTS, and therefore the HTC mobiles in issue, operate.

The HTC mobiles

27 I described how the UMTS devices worked in paragraphs 178 to 187 of my earlier judgment. This description was in relation to Nokia mobiles. However, because it was based on the UMTS standard, it is accepted as accurate for present purposes as well:

"178. ... The mobile is designed to receive two parameters of relevance. These are the dynamic persistence level, N, and the AC to ASC mapping information. I explain these in some more detail below.

179. Any device operating in accordance with the A1 method must be a member of at least one Access Class (AC). There are 10 normal ACs, numbered from 0-9. Every device must be a member of one of those normal ACs and the number of the particular AC to which the device belongs is stored on its SIM card. There are another 5 special Access Classes (11-15) designated for use by special groups of users such as emergency services and network staff. All access classes may be barred at any time by the network.

180. The next thing which it is necessary to understand is how the A1 selects an Access Service Class ("ASC") which it will use for its access attempt. These ASCs are different from the AC stored on the SIM. As I have said, the transmitted data includes an element entitled "AC-to-ASC mapping". This allocates each AC to an ASC. There are 8 ASCs numbered from 0-7. The mapping is carried out by the device reading the information element (IE) in the System Information Block appropriate to its AC. The way this is done is set out in Table 2 taken from the A1 Product and Process Description. ACs 0-9 look at the first IE in the block, 10 the second, 11 the third and so on.



181. Depending on which ASC has been allocated by the mapping process, the device works out a "persistence value" known as $P(i)$, (not the same as the dynamic persistence level, N , sent by the network). The way this is done is set out in Table 1 taken from the A1 Product and Process Description:



182. It can be seen that there is a difference between ASC 0 and the other ASCs. If a device is in ASC 0 the device automatically sets its persistence value, $P(i)$, to 1. This conclusion is arrived at directly from the AC to ASC mapping and not from the other parameter of importance, the dynamic persistence level, N .

183. On the other hand, if a device is in one of the other ASCs (1-7), it has to carry out a calculation using the dynamic persistence level, N , sent by the network. The formula to derive $P(i)$ in such a case involves $P(N)$ where

$$P(N) = 2^{-(N-1)}$$

184. So $P(N)$ is a function of (i.e. mathematically dependent on) the transmitted dynamic persistence level.

185. If the network wishes to distinguish between ASCs 1-7 it can optionally broadcast a scaling factor which may be different for each ASC. Each device is programmed to apply the scaling factor appropriate to its ASC when calculating the $P(i)$. That is why the boxes in Table 1 above include the scaling factors s .

186. $P(i)$ is used by the device to determine whether or not it can start transmitting over the RACH. It does so by a persistency test. The persistency test involves the device randomly generating a number R . Armed with R and $P(i)$, the device then compares the two. If R is less than or equal to $P(i)$, the device is permitted to transmit on the RACH. If R is greater than $P(i)$, transmission on the RACH is not permitted in that time interval and the device must wait until the next transmission time interval designated by the network. In other words the device operates a lottery.

187. Devices which are mapped to ASC 0 by the network will automatically pass the persistence test because the random number can never exceed 1. Those devices which are mapped to ASC 1 or higher may or may not pass the persistence test. Whether they pass the persistence test depends on the value N sent by the network."

28 That system was held to infringe the claims of the patent in their original form on the following basis:

(i) the bits used in UMTS to transmit the dynamic persistence level, N , constitute the access threshold value bits;

(ii) the AC to ASC mapping information in UMTS constitutes access class information;

(iii) $P(N)$ is an access threshold value which is determined from the access threshold value bits;

(iv) The AC to ASC mapping information is used to determine whether the device is in:

(a) ASC 0, in which case it is permitted to access the RACH independent of the received access threshold value bits because it has a $P(i)$ value of 1 which is not a function of the persistence level N which is being broadcast by the network; or

(b) an ASC other than 0 in which case it must determine access permission on the basis of an evaluation of $P(N)$ which comprises a comparison of $P(N)$ with a randomly generated number.

29 The two pieces of information which are now of significance are the dynamic persistence level N (which represents the access threshold value) and the AC-ASC mapping information (which is access class information). The manner in which these two pieces of information is sent on the BCCH is now the focus of the issues of infringement. The judge explained this at paragraph 56 of his judgment:

"The manner in which the information is sent is as follows. The data passes to the mobile over a logical channel known as the Broadcast Control Channel (BCCH). The information sent on the BCCH is arranged in blocks. There are Master Information Blocks (MIBs) and System Information Blocks (SIBs). While there is only one kind of MIB, there are a number of different SIBs (SIB 1, SIB 2 etc.). The MIB tells the mobile what the schedule of SIBs on the BCCH will be. Each SIB contains a mixture of

mandatory and optional information. The dynamic persistence level N is in SIB 7 whereas the AC-ASC mapping information is in SIB 5. These SIBs need not be sent at the same rate or on the same schedule. The network operator is free to set the rate and schedule (within limits). The data defined to be in SIB 7 is data which might change frequently and so one might expect SIB 7 to be sent more often than SIB 5. Perhaps some network operators do that but figures published in the Qualcomm paper (On Standby Battery Life of Mobile Devices in UMTS Networks by Catovic et al) show that on the three networks tested there, SIB 5 and SIB 7 were being sent at the same rate."

30 So the two pieces of information of interest are sent in separate information blocks or SIBs. They are not all part of a contiguous bit pattern, as in the second exemplary embodiment of the patent. The SIBs are discrete parts of the logical channel. The contents of the SIBs, which are called information elements, are not always the same because of the optional features. This has two consequences. Firstly the individual SIBs are not of fixed length: the presence or absence of optional elements may result in a lengthening or shortening of the SIB. Secondly the individual elements may change their position within the SIB, sliding up or down the order depending on the presence or absence of optional elements. The mobile is able to calculate the position of the information in the SIB from information in the MIB and/or the header of the SIB. What the information relates to is laid down by the standard.

31 Moreover, in UMTS, the AC-ASC mapping information is not sent as a single bit per user class, but consists of three bits. I shall have to explain this further below.

The judgment of Birss J

32 Before the judge the parties disputed the meaning to be attributed to the term "bit pattern" and whether the two items of information were transmitted as a bit pattern in UMTS. IPCom, based on evidence given by its expert Dr Irvine, advanced a broad construction of the term. It submitted that the purpose of the term as used in the claim was to provide the relevant information from the network to the mobile stations in the form of bits in recognisable positions so that the mobile stations can perform the process described in the claim. In UMTS each complete set of system information sent on the BCCH contained both the AC-ASC mapping data and the threshold value, each within its respective SIB. Although the position of the particular items of information of relevance within the SIB's could vary, depending on which optional elements are used, the information itself appeared in fixed, predetermined positions on the BCCH, repeatedly every 128 frames.

33 HTC, on the other hand, submitted that a bit pattern was a known and repeating structure of fixed length which enabled the receiver to know the significance of a bit from its position within the pattern. They also submitted, based on the evidence of their expert, Mr Simmons, that the sequence of bits in a bit pattern needed to be contiguous, although by the end of the trial their submission was that the debate about "contiguity" was something of a red herring. The key attributes of a bit pattern were that it needed to have a fixed format and a fixed length, with the meaning of the bits ascertainable from their position.

34 The judge held that the term "bit pattern" was a technical term as to which evidence as to its meaning in the specific technical field was admissible. He accordingly had regard to some definitions produced by Mr Simmons, both of the term "bit pattern" and the term "bit string" with which it was sometimes contrasted. Some of the definitions of "bit pattern" were extremely general, such as, for example: " *A combination of binary digits arranged in a sequence* ". The most detailed definition was that from the Free Online Dictionary of Computing (FOLDOC):

"A sequence of bits, in a memory, a communications channel or some other device. The term is used to contrast this with some higher level interpretation of the bits¹ such as an integer or image. A bit string is similar but suggests an arbitrary as opposed to predetermined length."

35 The judge returned to the distinction between a bit pattern and a key value pair at paragraph 68. He pointed out that Dr Irvine had accepted this distinction and explained that the contrast was

that in a bit pattern it is the position of the bits which define their meaning whereas in a key value pair the key sent with the value defines the meaning of the value. Dr Irvine had also accepted that when data is transmitted in a regime with bit patterns, efficiency increases because there is no need to send an identifier for each value. That is because the identifiers must have been agreed in advance.

36 At paragraph 69 the judge concluded that, to the relevant skilled addressee in the technical context of this patent, a bit pattern was a format. It consisted of a sequence of bits of a predetermined length where significance is carried by the position and value of the bits in the sequence. This was in contra-distinction to a bit string which is of arbitrary length. The judge rejected the suggestion that the relevant bits had to be contiguous, although this might be the case. He held that the term was being used in the patent and in the claims in this conventional sense: see paragraphs 70 and 83. He rejected the idea that the patent was not really about the way in which the information was sent:

"With the claim I have to consider, the skilled addressee would attribute significance to the reference to a bit pattern. It is a requirement related to the manner in which the access authorisation data is to be transmitted. This makes sense given the concern about transmission efficiency. Efficiency arises from the fact that information needed to parse a collection of bits forming a bit pattern does not need to be transmitted. It is true that there are no paragraphs in the specification which discuss the reason why a bit pattern is efficient, but this is because the understanding is part of the skilled addressee's common general knowledge."

37 The judge went on to explain later in his judgment that, as a matter of language, the claim clearly covered the case in which both pieces of information (the access threshold value bits and the access class bits) were found in the same bit pattern. That was the second exemplary embodiment which formed the basis for the claim. He went on to consider whether the claim also covered a case in which the two pieces of information were found in distinct bit patterns. He concluded (at paragraph 96) that if SIB 5 and SIB 7 were each a separate bit pattern, then UMTS would infringe. The language of the claim was apt to cover a case in which each of the two pieces of information was transmitted as a bit pattern, albeit in a separate one, "*provided the system needs both at the same time, as in UMTS*". He recognised that this interpretation would not cover the first embodiment.

38 Turning to infringement, at paragraphs 89 and 90 the judge rejected ICom's case that, simply because information on the BCCH was sent as a repeating stream of bits it could be said that all the relevant information was sent as a bit pattern. That view took no account of the language of the claim.

39 At paragraph 91 the judge accepted a submission of ICom that, within the SIBs, the individual bits comprising the access authorisation data are contained in particular information elements at positions laid down by the standards so that the mobile can identify them. However the position of the information elements relevant to this case could be affected by optional information elements. The network sent information in the header or the MIB to inform the mobile which optional elements have been used.

40 Despite his view that the claim was wide enough to cover the information being sent in two separate bit patterns, the judge considered that the UMTS mobiles did not infringe on the facts. Merely because data was sent on the BCCH did not mean the data was sent as a bit pattern. He was not satisfied that either SIB 5 or SIB 7 was itself a bit pattern. Both might (or might not) contain some bit patterns, but that was "a different point" and "was not established in any event". He was not satisfied that the access authorisation data in UMTS was transmitted in a bit pattern format at all.

41 Turning to "the access class bit", the judge considered the issue to be whether the AC to ASC mapping information element which, as I have explained, is a three bit binary number in UMTS, meant that there was no infringement now that the claim required determination by means of "the access class bit". He noted that at a conceptual level there was only one bit's worth of information which needed to be conveyed to the mobile in UMTS in order for it to make its decision. The real debate on construction and infringement was whether the claim was limited to a "physical bit", as HTC contended, or whether it encompassed a system which sends a "conceptual bit's worth of

information" in amongst other information, as IPCom submitted. The argument which the judge ultimately accepted was set out in paragraph 114 of his judgment:

"Turning to the claim language itself, the skilled addressee would understand features G and K to refer to the decision making step rather than the data transmission step. In that respect it is different from the reference in feature C to transmission of information as a bit pattern. The decision made by the mobile is a binary determination: either one thing or another. Conceptually only one bit is required in order to make such a decision and in that sense the language of the claim means what it says, one single bit. One cannot disregard this limitation (see Virgin sub-paragraph (vii)). However in my judgment the skilled addressee would understand that, read in context, the single bit's worth of information required is a conceptual bit rather than a physical bit. A system which sends the single access class bit as a single conceptual bit's worth of information albeit encoded along with other dependent information so as to be as transmission efficient as possible, falls within the claim."

42 The judge did not find the "less conventional sources" relied on by the parties in aid of their cases to provide much assistance. By the "less conventional sources" he meant the reliance placed by HTC on what happened at a hearing before the European Patent Office, and the results of proceedings concerning the patent in other courts. As far as the EPO was concerned, he did not regard what occurred as sufficiently clear-cut. He set out his findings as to what occurred in the EPO in an annex to his judgment, in case the matter went further.

43 The annex also considers an issue about translation. The German term to which "as a bit pattern" corresponds is "*als ein Bitmuster*". The difficulty arises because "*ein*" in German can mean "one" or "a". At paragraph (ix) of the annex the judge says that he considered the better translation of the term "*als ein Bitmuster*" to be "as one bit pattern".

44 Having reached his conclusions on construction the judge considered whether the result was that the amendments to the claims added matter. He concluded that they did not. Although the claims may have extended further than the second exemplary embodiment, in that they *covered* the case where the access authorisation data was sent in two parts, and the case where the access class information was more than a single bit, the claims did not disclose anything not disclosed in the application for the patent. Finally he rejected the suggestion that the amendments should be refused in the exercise of his discretion.

45 It follows that the issue on which IPCom lost was a factual one: whether it had been established that SIB 5 and SIB 7 were bit patterns as the judge had construed that term.

The arguments on this appeal in outline

46 Mr Purvis QC, who appeared on the appeal with Mr Brian Nicholson, submitted that infringement had been made out on the basis of the judge's construction. The access threshold value, i.e. the dynamic persistence level, was sent as a bit pattern within SIB 7, and the access class information, i.e. the AC-ASC mapping information was sent as a bit pattern within SIB 5. These were each sequences of predetermined length where significance was carried by the position and value of the bits.

47 On this issue, the judge had simply overlooked important and unchallenged evidence of HTC's expert, Mr Simmons. The judge had overlooked the evidence, perhaps because he had adopted a construction intermediate between the parties' primary submissions. Moreover, as the factual point had been common ground, the judge had not been specifically directed to the evidence of Mr Simmons.

48 Mr Adrian Speck QC, who appeared for HTC with Mr James Abrahams QC, submitted that the overall phrase "*the access authorization data are transmitted as a bit pattern*" imposed further requirements. He submitted that a key attribute of a bit pattern was that the "rules for parsing the information" were agreed in advance so that transmission capacity was not taken up by sending them. He further submitted that a bit pattern needed, as a matter of definition, to comprise more than one item of information, a requirement which the judge, at least implicitly, had recognised. In this connection he relied on paragraph 26 of the judgment, in which the judge's example included

two pieces of information. He further submitted, contrary to the judge's conclusion, that all the information, that is both the access threshold information bits and the access class bits, must be sent together as a single bit pattern, as shown in the second embodiment.

49 On the issue of fact, Mr Speck submits that it was far from being common ground that the information in question within the separate SIBs was sent as a bit pattern. The sentence from Mr Simmons' report on which IPCo now relies is taken out of context.

50 HTC also raise, by way of their respondent's notice, the further ground advanced before the judge as to why there was no infringement, based on the access class bit. In essence, Mr Speck submits that the judge ought to have held that the plain language of the claim limited it to the case where the information consisted of a single bit. He had been wrong to hold that a "conceptual bit" contained within a collection of three bits was within the claim. By doing so he had failed to take account of the fact that the claim had been amended from a form in which the information was referred to in general terms, to one which required an (he would say a single) access class bit.

51 If the court were to accept the broad construction of "bit pattern" or "access class bit" then Mr Speck submitted that the amendment to the claims would have had the effect of adding subject matter. The claims were an intermediate generalisation of what was disclosed in the example, and by taking some but not all of the relevant features of the example, the claims themselves disclosed a new combination of features. He accepted that the claim did not disclose a new way of carrying out the invention, but merely covered it. Nevertheless, the rules concerned with intermediate generalisation prohibited an amendment which adopted certain features of a combination disclosed by an embodiment, whilst discarding others, unless the skilled person would understand that there was no recognisable functional or structural relationship between the features.

52 Finally Mr Speck submitted that, having reached the conclusion which he did on construction, the judge ought to have refused the amendment in the exercise of his discretion. The effect of the judge's finding on the "better translation" of the German claim was that in due course, and at best, IPCo would have a claim more limited than that which they had sought and obtained for the time being in the UK. The judge should not have exercised his discretion so as to allow such a situation. He should have refused the amendment on his construction of the claim.

Proceedings in the German courts

53 Both sides placed reliance on proceedings in Germany in relation to the German designation of the patent. There are two such sets of proceedings, one started in the Landgericht Mannheim (with an appeal to the Oberlandesgericht Karlsruhe), and the other started in the Landgericht Munich with an appeal to the Oberlandesgericht Munich. Overall IPCo won in Munich but lost in Karlsruhe.

54 The Karlsruhe court found against IPCo on the "access class bit" point, holding that it allowed for only a single bit. Thus the three bit AC-ASC mapping information element in UMTS did not fall within the claim. On "bit pattern" the Karlsruhe court held that the claim required the use of a uniform, associated bit sequence having a specific length, but found that this feature was satisfied by UMTS but only on the basis of possible concatenation of the two relevant SIBs in UMTS.

55 The decision of the Oberlandesgericht Munich was different. Having reviewed the Karlsruhe decision and the decision of Birss J in this case, it held that there was infringement. It arrived at a similar construction of the claim to Birss J and went on to find infringement, partly on the basis of a concession on the "bit pattern" point which it nevertheless held had been properly made.

56 We were told that one difference between the approaches taken by the two courts was that the Karlsruhe court had regard to the prosecution history. Moreover, the question of whether it is appropriate to rely on prosecution history was being pursued on appeal to the Bundesgerichtshof, the Federal Supreme Court.

The relevance of events before the TBA

57 In HTC's skeleton argument much reliance was placed on what had happened in the EPO, in particular at the oral proceedings before the TBA in March 2013 when the final form of the claim was eventually arrived at. Before the judge, HTC had relied on the decision of Arnold J in *Actavis UK Ltd v Eli Lilly & Company* [2014] EWHC 1511 (Pat) at paragraphs 108-112 to suggest that this was an aspect of the prosecution history which was formally admissible and which was persuasive on both aspects of construction of the claim. Since the judgment in this case, this court has considered the issue of reliance on prosecution history: [2015] EWCA Civ 555; [2015] Bus LR 1068. In that case, I drew attention at paragraphs 54 to 60 to the difficulties which flow from relying on evidence as to the prosecution history, not least the burden it places on a reader of the specification to equip himself with what may be a long and complex history before being able to come to a conclusion as to the interpretation of a claim, as well as to the peripheral issues it is likely to create. It was not necessary in that case to come to a conclusion as to whether the prosecution history was formally admissible or not.

58 In the end Mr Speck placed no reliance on the detail of what had occurred before the TBA. I think he was entirely right to do so. The enquiry before the judge into what happened before the TBA involved receiving evidence from no less than five witnesses, including four who attended the TBA hearing and an expert, independent translator, who did not. The parties were not agreed about what happened at the hearing, or about the significance of those events. The debate extended to the question of what the TBA had in mind when it accepted the final form of amended claim, having rejected earlier ones. The judge was right not to place any reliance on this material. It is an illustration of the impossible burden it places on a skilled reader if it were to be recognised as a legitimate aid to construction.

Discussion

59 Subject to the point I have mentioned above concerning the role of the fact that the patent has been amended, there was little dispute about the correct approach to the construction of patent claims. Mr Speck emphasised that the inventor's technical purpose was not always the sole purpose which it was important to have in mind. The purpose of the language used by the patentee might also be relevant. For example, it is well known that the language should not in general be taken to encompass prior art mentioned in the specification, because it is unlikely to have been the inventor's purpose to cover it. Mr Purvis did not suggest that this was the wrong approach, and I accept it.

"The access authorization data are transmitted as a bit pattern"

60 It is convenient to consider the construction of this term first of all, and then to consider whether infringement was established.

61 The issues divide into two types. The first type concerns the essential requirements of the term "bit pattern", which are, as a result, made features of the claim. The judge held the term to be a term of art and considered evidence as to its meaning from acontextual sources. Although his skeleton argument contained a challenge to this approach, Mr Purvis, in the end, did not pursue it.

62 The second type of issue arises out of the phrase "transmitted as a bit pattern" and whether this implies a single bit pattern, or whether two or more are permitted. This is an ordinary issue of construction of the patent, dependent on context.

63 I start by identifying the common ground. Firstly, the parties are agreed that a bit pattern is a sequence of bits of predetermined length. Secondly, they agree that significance must be carried by the position of the bits in the pattern. They disagree, as it seems to me, on two points. Firstly, does a pattern cease to be within the definition of bit pattern if it is necessary repeatedly to send information identifying the position or significance of the information? I call this the "no identifiers point". Secondly, must a bit pattern contain more than one item of information, and what is meant by this requirement? I call this "the multiple items point".

64 Having decided what the requirements of a bit pattern are, it is necessary then to consider whether the patent requires a single bit pattern to transmit both the access threshold value and the access class information? I call this "the one bit pattern point". There is further common ground here, namely that it is not necessary for the bits representing the threshold and class

information to be contiguous within the bit pattern.

The no identifiers point

65 The judge referred to the distinction between key value pairs and bit patterns. In the former, the key sent with the pair defines the meaning of the data, whilst with the latter it is the position of the bits which define their meaning. In the course of argument before us it became apparent that there are difficulties at least in the context of this patent, in saying that something ceases to be a bit pattern merely because some information about the nature of the item of information accompanies the transmission. As Kitchin LJ pointed out, the two bit patterns illustrated as alternatives for the first embodiment in the patent each commence with a binary evaluation bit, which tells the mobile which of the two possibilities as to information content are to follow. There is no completely clear dividing line, therefore, between a bit pattern and a key value pair in this respect. Mr Speck did not suggest that the patent was in error in describing Figures 3 (a) and 3(b) as bit patterns, a submission which was open to him given the judge's finding that it was a term of art. What is clear, however, is that the position of the remaining bits in those Figures, and the position of all the bits in Figure 3(c), has significance.

66 In addition to it being permissible to send some information about the nature of the information in a bit pattern, it must also be permissible for information to be sent about where the bit pattern is to be found. There would be no point in simply transmitting a pattern of bits, which otherwise complied with the judge's definition, without at least informing the mobile as to where the bit pattern commenced.

67 It is therefore not possible to exclude from the definition of bit pattern an arrangement in which information is sent about the nature and position of the pattern. What is necessary is that the position of the bits has significance, and that the pattern is of predetermined length.

The multiple items point

68 Mr Speck made it clear that he did not suggest that the definition of bit pattern excluded one which contained several different items of the same type of information, such as the access class bit for each of a number of different access classes. However he submitted that the definition did not cover the transmission of a single value, albeit by means of a number of bits, as exemplified by the sending of the access threshold value in a case where several bits are used to convey it. This would be the transmission of a single item of information, and therefore not within the definition.

69 I think there are difficulties with placing this further gloss on the meaning of bit pattern. Firstly, and most fundamentally, there is the question of what is meant by "an item of information", if it is indeed part of the definition. Different, separately transmitted values for different access classes is a clear example of different items of information. Successive bits which together convey a value are also, when considered separately, different items of information. Each bit has a significance which is different from the next bit, and its significance is determined by its position in the sequence. In this respect the bits are items of information.

70 Secondly, this requirement is not a feature of any of the dictionary definitions relied upon by Mr Simmons and cited by the judge at paragraph 65. Mr Speck suggested that the third definition drew a distinction between a bit pattern and an integer or image, but that is not so. The definition is referring to levels of interpretation: a bit pattern is, as one might expect, directed at the level of the sequence of bits, not their higher level interpretation into an integer or an image. If anything this definition supports IPCOM's construction, that there is no reason why the bit pattern cannot be interpreted as an integer.

71 Thirdly, there is a problem made clear by the patent itself. In the first embodiment, Figure 3(a), what is sent (apart from the evaluation bit S4) is the access threshold value (S3, S2, S1 and S0) and the D and P bits. The D and P bits are, however, optional. It would be strange if the case where only the evaluation bit and the four access threshold value bits are sent was not covered by the term "bit pattern". The answer to this might be that the sequence of bits has become a key value pair, rather than a bit pattern, but given the hazy dividing line between the two concepts, I doubt this would be the reaction of the skilled person.

72 Fourthly, even if the sequence S4, S3, S2, S1, S0 is a key value pair rather than a bit pattern,

a sequence of the four bits S3, S2, S1, S0 (i.e. without the evaluation bit being sent) can still be regarded as a bit pattern, with each of the bits having significance determined by its position. The distinction is that, in these circumstances, the meaning of the bits would have to have been agreed in advance between the transmitter and the receiver.

73 HTC contend that this is to give "bit pattern" such a wide interpretation that it encompasses almost all information sent digitally. It is true that the term so construed is wide. But the judge's definition, drawn from the dictionaries to which he referred, is also a wide one. In this connection it is worth referring to one of the definitions of "bit string" taken from the McGraw-Hill Dictionary of Scientific & Technical Terms, which Mr Simmons referred to for the contrast:

"An ordered sequence of bits. This is very similar to a bit pattern except that the term 'string' suggests an arbitrary length as opposed to a pre-determined length 'pattern'."

74 It is therefore not surprising that bit patterns are ubiquitous within digitally transmitted information.

75 The significant feature of similarity between the bit string and the bit pattern is the order of the bits. What distinguishes the two is the predetermined length. There must plainly be more than one bit, otherwise there is no ordered sequence, and no significance can be attached to position. But there is no need for a requirement that the ordered sequence must relate to more than one item of information.

The single bit pattern point

76 The judge gave a number of reasons why the skilled person would not regard the term "bit pattern" to require that the access threshold value and access class information should be sent in a single bit pattern. Firstly he held that the language was apt to cover the situation where the access threshold value and the access class information were sent as a bit pattern, albeit each was in a different bit pattern. The words referred to the format in which the data was transmitted and would be satisfied in that case. The construction adequately distinguished between the two exemplary embodiments, so that the first embodiment was properly disclaimed. He held that his interpretation took due account of equivalents, as it was required to do by Article 2 of the Protocol on the Interpretation of Article 69 of the European Patent Convention. Finally, whilst it was true to say that the inventor's purpose was not the only consideration, it was relevant to note that the objective of using the transmission efficient bit pattern format would remain fulfilled on this construction of the claim.

77 Mr Speck drew attention to the fact that in the amended claim the access threshold value bits and access class bits are classified together as "access authorization data", and it is therefore the access authorization data including both elements of data which must be transmitted as a bit pattern. The skilled person would know that sending more than one piece of information in a bit pattern was efficient, because the mobile could use position to determine what the information relates to. Accordingly the language of the claim would not suggest to the skilled person that more than one bit pattern could be used for this purpose.

78 Mr Speck also placed reliance on the contrast between the first and second embodiments, and the fact that the skilled reader is told expressly that it is the second embodiment which is the basis of the claims. It would be surprising, he submitted, if a claim based on the second embodiment were to include within its notion of "bit pattern" the two bit patterns identified for use in the first embodiment.

79 Finally Mr Speck submitted that the judge had not arrived at a truly purposive construction. Instead he had become confused between the purpose of the data once it had been received by the mobile and the way in which the data is transmitted.

80 Viewing all his points together Mr Speck submitted that the judge had fallen into error in his construction of the term.

81 I prefer the judge's construction of this aspect of the claim. Taking Mr Speck's points in reverse order, I reject the suggestion that the judge was confused as to the relevant purpose. He expressly concluded that his construction satisfied the transmission efficiency purpose of the

claim. If the two items of information are each sent as a bit pattern, like the judge, I can see no reason why the transmission efficiency objective would not be satisfied. Transmission efficiency is an inherent property of the bit pattern. Indeed circumstances may make the method where two bit patterns are used more efficient, for example where one of the items of information is likely to change more frequently than others, and would need to be sent more often as a result.

82 As to the contrast between the first and second embodiments, the skilled person would not conclude that the key, or even an important difference between the two was the use of a single bit pattern. The judge was aware of the other, technically more important differences, namely the different meaning of the Z bits in the second embodiment ("maybe" rather than "no") and the fact that the mobile is set up to deal with both types of instruction at the same time. It would therefore come as to no surprise to the skilled person that the single bit pattern shown in Figure 3(c) could be split into two bit patterns, provided that the two pieces of information are each transmitted as a bit pattern.

83 I agree that the skilled person would know that it might be more efficient in some circumstances to send all the information as a single bit pattern. Proceeding by way of two bit patterns would involve sending some further information to indicate where the second bit pattern commenced. It would remain the case, however, that the nature of the information would be a matter agreed in advance between the network and the mobile (and therefore not take up transmission capacity) and that significance would still be attached to the position of bits within the pattern. Further, as the judge appreciated, there might be good reasons why the two different types of information might need to be sent at different rates. I agree with the judge, therefore, that on a purposive construction the claim language is apt to cover the situation where each of the access threshold value and the access class bits are sent as a separate bit pattern. The judge was right to consider that setting things up so that the information is received in separate bit patterns made no difference to the way in which the invention described in the amended claim worked: it was in short an equivalent to which he should have regard bearing in mind Article 2 of the Protocol. Only a resort to literalism would convey a contrary meaning.

84 To my mind, the judge's construction in paragraph 96 did exactly what he said it did: it paid proper respect to the language of the claim, took account of equivalents, and gave proper weight to the inventor's purpose. I would reject HTC's appeal against the judge's construction of "transmitted as a bit pattern".

Infringement on the facts

85 IPCom's case advanced on this appeal is that the access threshold value and the access class bits are each sent as a separate bit pattern within their respective SIBs. The case depends on the judge having accepted, or being bound to accept Mr Simmons' evidence, which it submits is to that effect.

86 Thus at paragraph 8.22 of his third report, Mr Simmons explained that the AC-ASC mapping information (contained in SIB 5) for the seven user classes was a sequence of 21 bits. At 8.27 he explained his understanding of a bit pattern to be:

"... a sequence of contiguous bits, where significance is carried by the position and value of the bits."

87 Comparing this definition with the judge's, it does not expressly include the requirement that the sequence be of predetermined length. However it was Mr Simmons who produced the definitions on which he and the judge relied, a prominent feature of which was the requirement for a predetermined length. Then, at paragraph 8.33 of the same report Mr Simmons continued:

"Although I understand that the interpretation of the Proposed Amended Claim is a matter for the Court, in my opinion it would be incorrect for an engineer to describe in a technical document the transmission of the access authorization data ... as being "transmitted as a bit pattern". This access authorisation data is *transmitted as multiple bit patterns* within SIB 7... and SIB 5." (emphasis supplied)

88 Mr Purvis submits that Mr Simmons' evidence is very clear. The reason which Mr Simmons was giving as to why the language of the claim did not apply to UMTS was that there was no single sequence of contiguous bits, where significance is carried by the position and value of the bits. There were however multiple such sequences carrying the access authorization data within the respective SIBs.

89 Mr Purvis also relies on the decision of the Oberlandesgericht München where he submits that the court came to the same view. He relies in particular on the following paragraph of the judgment of that court:

"The data sets of the AC-to-ASC mapping, and the dynamic persistence level N within SIB 5/5bis or 7, each represent – and this is not disputed by the Defendants – a bit sequence of a specific length; they contain specific information components relevant for access authorization to the RACH which the mobile station can identify and read on the basis of the predefined bit position configuration of this bit sequence of which it is notified in advance by the MIB. The data sets of the AC-to-ASC mapping and the dynamic persistence level N must therefore be regarded as bit patterns in the sense of the Disputed Patent."

90 Although the point does not appear to have been in issue in the Munich proceedings, the court is expressly approving the concession made by the defendants there and explaining why it was correct. Mr Purvis adopts that reasoning here.

91 Mr Speck submitted that it was not open to IPCoM to take this point on appeal. The judge's attention had not been drawn to the impact of Mr Simmons' evidence. Moreover, Mr Simmons' evidence was directed to the specific issue of whether the data is sent in a single bit pattern. He was referring compendiously to all the data alleged to be access authorization data (including S values which are no longer relied on). It was merely his way of explaining that the access authorization data was not all sent in a single bit pattern.

92 The first question is whether it is right to allow IPCoM to advance this case at all on this appeal because it represents a variation of its case below. IPCoM's primary case before Birss J was that the BCCH was itself a bit pattern, and that all that was necessary was for the mobile to be able to correctly identify the transmitted information. The judge rejected this argument at paragraphs 89 and 90, and that rejection is not challenged on this appeal. The judge also recognised (at paragraph 94) a secondary case effectively advanced by IPCoM which was that each of SIB 5 and SIB 7 was itself a bit pattern. He rejected that case (at paragraph 97), presumably on the basis advanced by HTC, that the two SIBs had a variable form and/or a variable length (see paragraph 94). Again, Mr Purvis does not pursue this case on appeal. In the closing sentences of paragraph 97 the judge recognised a further alternative case, namely that there were bit patterns "within the SIBs", but said "that is a different point and was not established in any event".

93 Mr Purvis submitted that IPCoM could not be sure which of the various potential interpretations of the claim the judge was ultimately going to accept. At that stage IPCoM did not accept that "bit pattern" required a sequence of predetermined length. HTC for its part was contending for one single bit pattern. Mr Purvis' submission to the judge had been that the only construction which avoided infringement was one which required contiguous bits, since UMTS required a gap between SIB 5 and SIB 7 (paragraph 22 of IPCoM's closing quoted in paragraph 92 of the judgment). What that submission failed to appreciate is that the judge might reject the one single bit pattern argument, but accept the requirement for a sequence of predetermined length.

94 Paragraph 8.33 of Mr Simmons' third report was not highlighted for the judge in IPCoM's closing submissions. Mr Purvis' suggestion that it was not possible to predict how the judge would ultimately construe the claim is correct, but the possibilities were, by the end of the trial, finite. It was certainly part of HTC's case that the bit pattern had to be of predetermined length. I am satisfied that HTC's final submissions made it clear that they did not concede infringement even if the claim allowed the two items of information to be transmitted in separate bit patterns. IPCoM could therefore have explained to the judge how UMTS satisfied the requirement of predetermined length if the judge came to the conclusion that that was a feature of the definition.

95 Whilst IPCOM's failure to stress paragraph 8.33 of the Mr Simmons' report before the judge is regrettable, I have come to the conclusion that it should not be treated as a bar to IPCOM's success on this appeal. That is because HTC have not, at least to my mind, advanced any tenable reason why Mr Simmons' evidence should not be accepted at face value.

96 The only way, in my judgment, that HTC can avoid the effect of Mr Simmons' evidence is to show that he was proceeding on an incorrect construction of the phrase "bit pattern". That is why I have dealt with all the arguments on construction at the outset. It is clear that Mr Simmons was proceeding on the correct construction of the term bit pattern: indeed it was his evidence that was the source of it. It is true that he imposed a requirement that the bits must be contiguous, but that does not assist in this context. His only point of relevance was that there were two bit patterns rather than one.

97 In reply Mr Speck showed us some evidence of Dr Irvine under cross-examination. Whilst it was put to him, and he accepted, that where you have a collection of a plurality of data, you can use context or position in relation to neighbouring elements to convey what the information relates to, it was not suggested that this was an essential requirement of a bit pattern. Indeed the cross-examination went on to put Mr Simmons' dictionary definitions to Dr Irvine. He did not quarrel with them.

98 I reject Mr Speck's submission that what Mr Simmons was trying to say in paragraph 8.33 was simply that there was not a single bit pattern. The evidence quite clearly goes further and states that the two values are transmitted as bit patterns. That is exactly what this integer of the claim, on its true construction, requires. The evidence was unchallenged, and had the point been drawn to his attention, the judge would have had to accept it. I therefore agree with IPCOM that infringement, at least on this integer, was established.

99 I have reached this conclusion without reliance on the cited German cases. It follows from my reasons and conclusion, however, that I prefer the reasoning of the Munich Court.

"Access class bit"

100 This is a pure point of construction, arising on HTC's cross-appeal. Mr Speck relied on the natural meaning of "bit" being a single binary digit. He drew attention to the use of "bits" in the plural in the claim (when referring to the bits for all the access classes) in comparison to the access class "bit" in the singular (when referring to the access class bit for an individual class).

101 Mr Speck also relied on the amendment of the claim from "access class information" to "access class bit". He submitted that the fact that the patent has been amended was an admissible aid to the construction of "access class bit". He submitted that the skilled person would understand from this change in language that something much more specific than mere information was being required. The judge's construction of access class bit, which introduced the concept of "a conceptual bit" gave the claim an equivalent scope to that which it had had before amendment. For that reason as well the skilled person would reject it.

102 Mr Speck submitted that the claim is directed to the use of a single bit flag to indicate whether the mobile can have access to the RACH without doing the lottery, or whether the mobile must do the lottery. The use of such flags was a common general knowledge method of limiting the amount of data to be sent. The claim was to be read as relating to that method only, and not to include different methods which were as efficient.

103 Mr Speck submitted that the judge's characterisation of the bit as "conceptual" had the effect of enlarging the claim to cover any method of transmitting the information, because the decision which the mobile had to take was, conceptually, a binary one. In those circumstances the requirement to use a bit was to be taken at face value. Although he did not put it this way, he submitted that a literal construction was to be preferred.

104 The judge had illustrated the point he was making on the construction of this integer by reference to two diagrams, labelled X5 and X6, and which he attached to his judgment as annex 3. In X5, a separate bit is used as a flag to tell the mobile whether it is to have access independent of the lottery, or whether it has to do the lottery. There are also bits which relate to each of seven ASCs in UMTS. For these ASCs one needs three bits, because it is not possible to code for seven possibilities using two bits: two bits will cover four possibilities, three bits will do eight. Thus, in the X5 arrangement, four bits are deployed in total. By contrast in X6 one takes

advantage of the fact that there are eight, not seven possible values represented by three bits. Thus, instead of a flag, one uses the spare capacity in the three bits to deal with the case where access is guaranteed independent of the lottery. Overall there is a saving of one bit compared to the use of a flag.

105 Mr Speck submits that the judge's use of X5 and X6 merely showed that there are more efficient ways of sending the data than that specified in the claim. The judge had again lost sight of the fact that the claim was concerned with how the data was transmitted, not with what the mobile did with the data when it arrived.

106 Mr Purvis supported the judge's construction of this feature. The judge had approached the claim from a correct technical standpoint. The decision required by the claim was a binary one. Whether that binary decision was effected by a separate bit, or the binary decision was "bundled in" with a three bit message which gave the same information plainly had no material effect on the way the invention worked. HTC's case to the contrary was an exercise in meticulous verbal analysis which the skilled person would reject.

107 Mr Purvis relied on a further passage from the decision of the Oberlandesgericht Munich:

"The District Court is also correct when it comes to the conclusion that it is not necessarily the case that features (2 d) or (2 f), according to which a decision is made " *on the basis of the access class bits relevant for the user class* " about whether or not the mobile station can access the RACH independently of the access threshold value bits received or only depending on the access threshold value evaluation, mean that the respective user class must be determined by way of one single "physical" or "formal" access class bit. In actual fact, it is only the control information which can be read from the "access class bit" included in both features mentioned which is decisive for the binary as to whether the mobile station is permitted to access the RACH independently of (in the sense of a "priority") or depending on an access threshold value evaluation ("lottery"). The access class bit does not, therefore, concern the signalling level, which is why it is also possible to talk about a bit in the "logical" or "actual" sense of a "conceptual" bit. Whether the access class bit is actually only coded with one bit or more than one bit, is thus not relevant to the question of whether the method according to the patent is implemented."

108 I find the judge's reasoning, which is in conformity with that of the Munich Court, more compelling than HTC's arguments. I do not think much can be gleaned from the use of the singular "bit" and the plural "bits" in the claim. However the term "bit" is construed it would be necessary to use the plural when referring to the different bits for the plurality of access classes and the singular when referring to the individual class. That is what the claim does.

109 I am also unable to draw any conclusion from the mere fact that the claim has been amended from "information" to "bit". The skilled person would not be able to ascribe any particular significance to this change. The word "bit" could, for example, have been thought to have been a more appropriate term to use to signify digital information. I do not think that the skilled person would allow the fact of this amendment to drive him to the conclusion that the patentee was using "bit" in a narrow, literal sense. It is not necessary for this purpose to reach a final conclusion on whether this limited reference to the history of the claim is formally admissible.

110 The judge's reliance on X5 and X6 was a powerful illustration of why the skilled person would not think that the patentee could be limiting himself to using a literal bit. To do so would be contrary to the patent's objective of improving transmission efficiency. To insist on the use of an extra bit when all that was required was the transmission of a bit's worth of information therefore runs against the grain of the document.

111 I would reject HTC's cross-appeal on this point.

Added matter

112 Neither side disputed the statements of the law on added matter in the well-known cases of *Bonzel v Intervention Ltd* [1991] RPC 587 at 616 and *European Central Bank v Document*

Security Systems Inc [2007] EWHC 600 (Pat) at [97-102]. The approach in these cases had been approved on more than one occasion in this court: see e.g. *Vector Corporation v Glatt* [2008] RPC 10 ; *Nokia Corporation v IPCOM* [2012] EWCA Civ 567 ; *AP Racing v Alcon Components* [2014] EWCA Civ 40 . Of particular relevance to this appeal is what Kitchin LJ said in *Nokia Corporation v IPCOM* at [57] to [60]:

"57. Particular care must be taken when a claim is restricted to some but not all of the features of a preferred embodiment, as the TBA explained in decision T 0025/03 at point 3.3:

"According to the established case law of the boards of appeal, if a claim is restricted to a preferred embodiment, it is normally not admissible under Article 123(2) EPC to extract isolated features from a set of features which have originally been disclosed in combination for that embodiment. Such kind of amendment would only be justified in the absence of any clearly recognisable functional or structural relationship among said features (see e.g. T 1067/97, point 2.1.3)."

58. So also, in decision T 0284/94 the TBA explained at points 2.1.3-2.1.5 that a careful examination is necessary to establish whether the incorporation into a claim of isolated technical features, having a literal basis of disclosure but in a specific technical context, results in a combination of technical features which is clearly derivable from the application as filed, and the technical function of which contributes to the solution of a recognisable problem. Moreover, it must be clear beyond doubt that the subject matter of the amended claim provides a complete solution to a technical problem unambiguously recognisable from the application.

59. It follows that it is not permissible to introduce into a claim a feature taken from a specific embodiment unless the skilled person would understand that the other features of the embodiment are not necessary to carry out the claimed invention. Put another way, it must be apparent to the skilled person that the selected feature is generally applicable to the claimed invention absent the other features of that embodiment.

60. Ultimately the key question is once again whether the amendment presents the skilled person with new information about the invention which is not directly and unambiguously apparent from the original disclosure. If it does then the amendment is not permissible."

113 Mr Speck submitted that, unless the features added by amendment are construed in the narrow sense for which he has contended, then the effect of the amendments is to add matter. He accepted that the effect of the amendments was not to disclose a new way of performing the invention. Nothing express is introduced into the claim to teach the skilled person, for example, to use more than one access class bit, or to separate the bit pattern of Figure 3(c) into two parts. However he submits that when one is basing a claim on a specific embodiment, it is not permissible to take certain features and not others. To do so is to disclose a new combination, that is to say a combination different from that disclosed by the specific embodiment on which it is based.

114 Mr Speck recognised that this principle must be subject to some exceptions. It cannot be necessary for example to include features which are not of significance to the way the invention is carried out by the embodiment. So much is recognised in the passage from *Nokia v IPCOM* which I have cited above.

115 More specifically Mr Speck submitted that a claim which takes the feature "transmitted as a bit pattern" from the second embodiment will add matter unless it also takes the requirement that the bit pattern is a single bit pattern. To do so without taking in this latter feature discloses a different combination, namely one without the single bit pattern. Likewise a claim which takes the access class bit from the second embodiment will add matter unless it is made clear that what is meant is literally a single binary digit.

116 HTC's arguments are advanced on the express basis that the judge was right on his construction of both integers. In the course of arriving at his conclusions on construction, the

judge must necessarily have concluded that the skilled person's understanding of the concept disclosed by the second embodiment was not limited to following its precise teaching as to whether there was a single bit pattern or a single access class bit. The teaching of the embodiment was sufficiently general to encompass variants which had no material effect on the way the invention worked. Although no relevant specific variant was taught, therefore, the skilled person would not understand minor variants to be excluded. It follows that the skilled person would not understand the single bit pattern or the single access class bit to be features of significance to carrying out the invention disclosed in the embodiment.

117 The claim as amended does not therefore disclose any additional matter. The reader of the amended claim would understand that it referred to the second embodiment as literally described, and minor variants. Again, he or she would not be taught any specific variant, as Mr Speck accepts. It is true that the combination disclosed by the claim does not require the features of a single bit pattern or a single access class bit, but neither did the combination disclosed by the embodiment. The combination disclosed by the claim is therefore no different to that disclosed by the embodiment itself.

118 I conclude, therefore, that the amendments did not add matter.

Discretion to amend

119 In allowing the amendments the judge was exercising a discretion. This court will not interfere with the exercise of a discretion unless the judge is shown to have gone wrong in principle, for example by taking into account some matter which he ought to have ignored, or by ignoring some matter which he should have taken into account.

120 The discretion to allow amendment of a UK patent was one which, in the past, was treated as encompassing a very wide range of factors: see *Smith Kline & French Laboratories v Evans Medical Ltd* [1989] FSR 561 at 569 (Aldous J, as he then was). The factors which were traditionally taken into account included the timeliness of the application to amend, the patentee's state of mind about the need for amendment, the effect of the patent in its unamended state on third parties and so on. Section 2(5) of the Patents Act 2004, however, introduced a new provision governing the exercise of the discretion into section 75 of the Patents Act 1977:

"(5) in considering whether or not to allow an amendment proposed under this section, the court or the comptroller shall have regard to any relevant principles of or under the European Patent Convention."

121 The approach to amendment adopted by the European Patent Office under the EPC does not involve anything like the former wide-ranging enquiry. The main matters considered are whether there is a need for the amendments and whether their introduction at a particular stage in the proceedings is procedurally fair. Considerations outside the proceedings are not taken into account. The effect of the new section 75(5) is therefore to limit the matters to which it is relevant to have regard: see *Zipher Ltd v Markem Systems Ltd* [2008] EWHC 1379 (Pat); [2009] FSR 1 at [217] to [220].

122 The judge dealt with this issue in the following way:

"130. HTC contend that the claim as construed by IPCom is different in scope from the one allowed by the EPO and, if that is so, the amendment should be refused in the exercise of the court's discretion under s75. Although the discretion is much reduced in scope compared with the past, HTC submit that it remains wide enough to justify refusal of the amendment if the premise is satisfied.

131. The major argument was about "as a bit pattern" and although I have rejected IPCom's infringement case, I have not accepted HTC's construction of the claim. I do not need to decide whether the claim in the UK has a different scope from the one allowed by the EPO because even if it does I would not refuse the amendment as a matter of discretion. The claim in the form sought here is valid and the amendment is

formally allowable. It does not add matter nor does it extend the scope of protection. In that case I do not see why it would be a proper exercise of the discretion under s75 to refuse a valid claim amendment simply because it produced a claim with different scope from the one allowed by the EPO, even if, as here, the ostensible motive for the application to amend was to produce a claim with the same scope. All the more so when the difference (if it exists) arises in the context of a debate about translations. So I reject HTC's case on that basis."

123 Although he recognised it was not necessary to do so, the judge went on to make some findings which he recorded in annex 1. This included his finding that the "better translation" of "*als ein Bitmuster*" was "as one bit pattern".

124 Mr Speck submitted that the judge did not take into account IPCOM's avowed intention to obtain a claim which was equivalent in scope to that approved by the TBA. The judge had also not appreciated that, when the claim takes effect at the end of the opposition, the patent will be limited to the German form of claim, which, on the judge's finding, was limited to one bit pattern.

125 Mr Purvis supported the judge's conclusion that the translation issue was irrelevant to the exercise of the discretion. Further he did not accept that the judge had made a finding as to the proper construction of the claim in German. Alternatively, if he had made such a finding, he challenged it.

126 I agree with the judge that IPCOM's intention to obtain a claim equivalent in scope to the German claim is simply irrelevant to the discretion to allow the amendment. Moreover, I do not think that the judge was, in any event, in a position to make a finding that the scope of the German claim would be different to that which he arrived at here.

127 The evidence before the judge on this issue can be summarised quite briefly. Ms Hinterleitner, the expert translator whose evidence was relied on by HTC, considered that the core issue was whether the German "*ein*" is to be translated into English as the indefinite article "a", or as the numeral "*one*". Her view was that, from a grammatical point of view both translations were possible and none of them could be ruled out as being incorrect as such. However she thought "when seen in the overall context" the translation "one" rather than "a" was correct. The overall context included a consideration of what happened before the Opposition Division, including the prior auxiliary requests rejected by the TBA, albeit without giving written reasons.

128 Ms Hinterleitner was therefore doing more than giving evidence about how the claim was to be translated, but was interpreting the events before the TBA and using them as part of the context in which the claim is to be understood. For reasons I have given I do not regard the events before the TBA as a legitimate aid to construction. Ms Hinterleitner was not in a position to express a view as to the meaning of the German claim to a person skilled in the art.

129 In addition it is fair to point out that the Munich court did not see the word "*ein*" as an obstacle to their construction of the claim (in German) in favour of IPCOM. As they said:

"... no decisive indications for the correct understanding of feature (1c) can be found in the wording of the claim. Where this reads "transmitted as a bit pattern", it cannot follow that this is the use of a in the sense of "a single bit pattern" since the word "a" can equally be understood as an indefinite article and therefore to merely determine the type of transmission means and not the number that thereof"...

130 I do not think that the judge was in a position to make a finding as to what the German claim meant on the basis of the evidence before him. To the extent that he was making such a finding, as opposed to a finding about how the word "*ein*" is to be translated, I consider that he was in error. It therefore seems to me that the factual basis of this aspect of the attack on the judge's exercise of discretion is not made out.

131 I would reject HTC's attack on the judge's exercise of discretion.

Conclusion

132 For the reasons I have given I would allow IPCOM's appeal and dismiss HTC's cross-appeals.

Lord Justice Kitchen:

133 I agree.

Lord Justice Longmore:

134 I agree also.

1. In the judgment, the words "of the bits" have been omitted from the transcription of the definition.

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